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PULP & PAPER

October 1987

FINISHING/CONVERTING:
Latest trends in equipment, operating strategy

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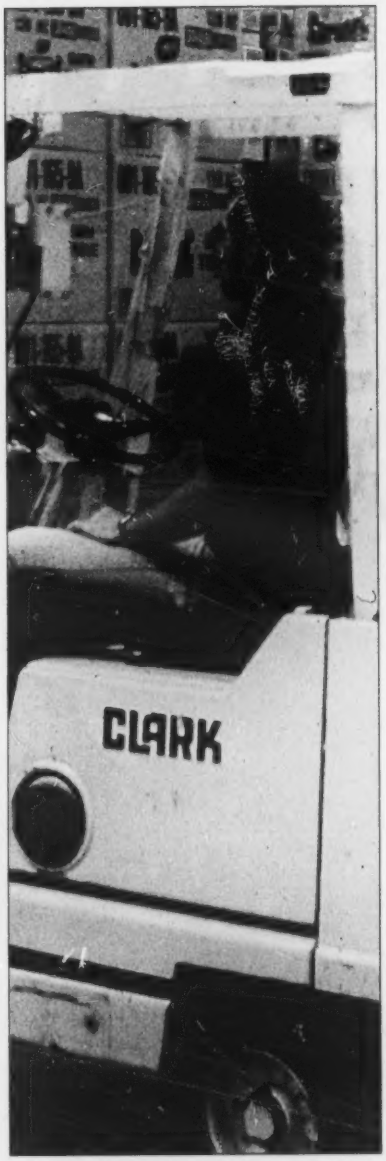

THE COVER

Among the latest trends found in finishing/converting, the highlight of this issue, is the use of mobile computer terminals, mounted on warehouse vehicles or hand held, for real-time inventory tracking and improved converting operations. The story on these systems begins on p. 100. **(Photo courtesy of LXE, a division of Electromagnetic Sciences Inc., Norcross, Ga.)**

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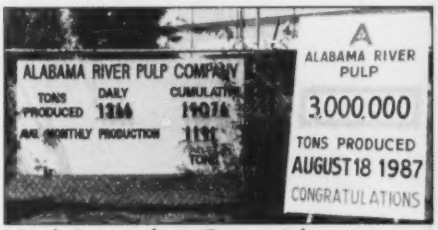

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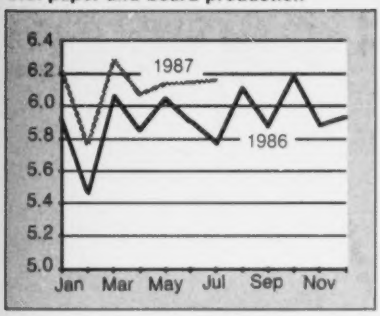
U.S. paper and board production



U.S. production of paper and paperboard totaled 6.2 million tons in July, up 6.8% from the same month last year, according to the American Paper Institute. The sharp increase is due in part to more flexible work rules that allowed mills to take less downtime this July than in previous years. As the accompanying chart shows, production actually rose slightly in July 1987 from the previous month, breaking the traditional pattern evident in the 1986 data. After taking these changes into account, API calculates that the seasonally adjusted trend rate was 73.1 million tpy for the month, up 4.6% from the year-earlier rate.

Among major grades, the paperboard sector continues to outperform paper. Containerboard production for domestic use was up a solid 7.1% compared with 1986, as fiber box shipments continued at record levels. Coated paper, up 10.7%, has posted the largest year-to-year percentage increases recently because of weakness last year caused by customer inventory imbalances.

Canadian newsprint shipments totaled 779,000 tons in July, up 2.8 from 1986. Woodpulp shipments of 652,000 tons were off 5.0%, however. Operating rates for the month stood at 92% for newsprint and 99% for pulp. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	July	502	5.2	5,760	2.8
Uncoated groundwood (s)	July	123	-3.9	1,520	0.6
Coated paper (s)	July	563	16.3	6,649	10.7
Uncoated free sheet (s)	July	915	4.7	10,703	3.7
Other printing/writing	July	101	-5.6	1,354	-1.9
Total packaging and other paper (s)	July	389	-6.7	5,046	-1.4
Tissue	July	432	9.4	5,196	2.7
Total paper	**July**	**3,025**	**5.0**	**36,227**	**3.5**
Unbleached kraft paperboard	July	1,632	13.5	18,606	6.6
Semichemical medium	July	471	6.8	5,610	5.8
Bleached paperboard	July	372	-1.3	4,414	2.4
Recycled paperboard	July	665	4.4	8,462	5.0
Total paperboard	**July**	**3,140**	**8.5**	**37,092**	**5.6**
Total U.S. paper and paperboard output	**July**	**6,165**	**6.8**	**73,319**	**4.5**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	June	4,977	2.7	58,985	3.7
Market pulp production	June	693	8.1	7,899	6.7
Wastepaper consumption at paper/board mills	June	1,474	6.5	17,415	4.2
Pulpwood consumption (cords)	June	7,723	2.1	93,238	2.6
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	July	25.341	5.8	172.403[6]	4.6
Containerboard inventories at U.S. box plants and mills	July 1	2,396	3.3		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	June	1,043	16.3	12,415	11.0
Imports of Canadian newsprint	June	741	14.5	8,716[6]	7.3
U.S. paper exports (including products)	June	484	28.4	5,133	10.7
Exports of unbleached kraft linerboard	June	221	38.1	2,253	13.4
Exports of woodpulp	June	455	22.3	4,742	6.9
Norscan pulp inventories[4]	July 31	960	-7.8		
Norscan pulp operating rates[4]	July	105%	100%	93%	98%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	July	779	2.8	5,620[6]	6.1
Operating rates	July	92%	96%	97%	93%
Inventories held by U.S. consumers	July 31	1,461	3.6		
Other paper/board shipments	July	518	5.1	3,684	6.3
Woodpulp shipments (export only)	July	652	-5.0	4,631	2.3
Operating rates	July	99%	100%	97%	91%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

PAPER-GRADE CHEMICAL MARKET PULP: Pulp bandwagon should continue through 1988

Grade structure: Chemical paper-grade market pulp is sold in the open market and does not include captive pulp used onsite or shipped to affiliated mills within North America. Pulp is divided into grades based on whether it is made from softwood or hardwood fiber, whether it is produced by the sulfate (kraft) or sulfite pulping process, and whether it is bleached, semibleached or unbleached.

Northern bleached softwood kraft (NBSK) is the premium pulp grade because of its long fiber length and strength, although papermakers have been making more use of southern pine and hardwoods. Market pulp is sold in sheets, flash-dried bales, or rolls.

U.S. chemical paper pulp statistics include about 1.7 million tons of fluff pulp production (including exports) used in diapers and other absorbent hygiene products. Dissolving and chemical pulp grades are excluded from the statistics.

Production/capacity: North American market pulp producers are enjoying a strong recovery this year, thanks to the declining U.S. dollar, continued growth in demand, and limited capacity expansion. The weak dollar has made pulp price increases over the past two years easier for buyers in Europe and Japan to accept, and it has improved the cost competitivness of U.S. and Canadian producers vs competitors in Scandinavia.

Chemical paper-grade market pulp production this year is expected to be up about 7.5% in the U.S. to 6.1 million metric tons and up 10% in Canada to 7.3 million tons. Producer inventories in North American and Nordic countries hit a seven-year low of 795,000 tons and are expected to end the year at about 1.0 million tons or less.

Consumer inventories are reported to be at moderate levels—538,000 tons at the end of June in the U.S., up only 1.7% from a year ago.

Future outlook: Canadian and U.S. mills are expected to run near full capacity again in 1988, with continued growth in demand and limited capacity expansion. This is based on the consensus estimate of about 2.8% growth in the U.S. economy next year. Historically, pulp prices have tended to lag turning points in the economy by a couple of years.

The only major new market pulp project announced for North America is Champion International Corp.'s plan to double the size of its Hinton, Alta., softwood mill to 424,000 tpy by late 1989 (which may be partly offset by a new paper machine at its Quinnesec, Mich., pulp mill). In addition, Daishowa Paper of Japan is studying a possible 340,000-tpy hardwood pulp mill for northern Alberta.

One possible supply-side concern is about 1.0 million tons of bleached chemi-thermomechanical market pulp, which will be coming onstream in Canada over the 1986-88 period. Meanwhile, the growing use of superabsorbents has reduced U.S. fluff pulp consumption in baby diapers by an estimated 150,000 tons in the past year.

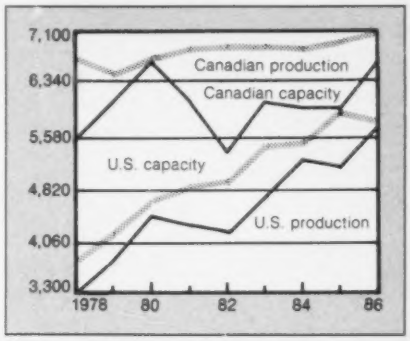
Such "thin" diapers have already captured 50% of the U.S. market and and may hit 90% in a couple of years. This would further reduce fluff pulp use since superabsorbent diapers contain about 30% less fluff on a unit basis.

Several major eucalyptus pulp expansions are planned in Brazil for the early 1990s. The most definite is Aracruz Celulose SA's plan to more than double capacity to 1 million tons.

Pricing: Pulp prices have risen practically each quarter since the end of 1985. The benchmark price of NBSK in Europe has risen from a low $390/metric ton in late 1985 to $635 by the fourth quarter of 1987. Prices may rise again in the first quarter or second quarter of 1988. Such a scenario would depend on continuing weakness in the dollar and healthy paper demand which would permit pulp buyers to pass through their costs.

Year-end U.S. market prices ($/metric tons delivered) for NBSK: 1980, $530; 1981, $530/$565; 1982, $440; 1983, $450; 1984, $510; 1985, $390; 1986, $480/$520; 1987, $610. (For further details, see *P&P PriceBook 2*.)

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1985	1986	1987e
Production[1]	5,093	5,718	6,145
Capacity	5,923	5,758	6,192r
Utilization rate	86.0	99.4	99.2
Imports	2,296	2,498	2,445
Exports	2,828	3,405	3,490
Apparent U.S. consumption	4,561	4,811	5,100
Canada	**1985**	**1986**	**1987e**
Production[1]	5,968	6,600	7,260
Capacity	6,929	7,151	7,265
Utilization rate	86.1	92.3	99.9

e = estimate.
r = revised.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Weyco[1,2,3,5,6]	1,200	8.9
2. G-P[1,2,5,6]	670	5.0
3. IP[1,6]	650	4.8
4. Canfor[1,3,4]	620	4.6
5. P & W[1,2,a]	590	4.4
6. GLFP[1,2,3]	585	4.3
7. Repap[1,3,4]	520	3.9
8. MacBlo[1,3,4]	480	3.6
9. BCFP[1,3,4]	480	3.6
10. Leaf River[1,2,3]	450	3.3

Market share of top five companies: **27.7%**

Market share of top ten companies: **46.4%**

Total North American capacity (1987): **13.457 million metric tons**

1. Bleached softwood kraft.
2. Bleached hardwood kraft.
3. Semibleached softwood kraft.
4. Unbleached kraft.
5. Bleached sulfite.
6. Fluff pulp.

a = Parsons & Whittemore.

strongly denied Wall Street speculation that the company itself might be for sale.

PCA said it planned to keep five folding carton plants (Grand Rapids, Mich.; Mentor, Ohio; Salt Lake City, Utah; St. Louis, Mo.; and Denver, Colo.) because they are profitable and to meet customer commitments. The plants have been increasingly using virgin boxboard grades recently and fit in closely with some of PCA's specialty plastic/aluminum food packaging operations.

Republic Gypsum reported net sales of $56.8 million and net income of $4.3 million for the fiscal year ended June 30. It is anticipated that the addition of the PCA operations would raise net sales by about 150%. ■

Plastic inroads in milk cartons slow

Paperboard Packaging Council reports that its campaign to promote the use of paperboard milk cartons as opposed to plastic bottles has reversed the long-term decline forecast for solid bleached sulfate (SBS) cartons.

The PPC has been promoting SBS cartons since 1983, asserting that paperboard cartons protect milk from vitamin-damaging light better than plastic containers. The campaign is to run through 1988. A spokesman for the PPC said the paperboard industry is not experiencing a loss of 15,000 to 20,000 tpy in board consumption that was initially forecast when plastic milk bottles came on the scene.

U.S. Dept. of Agriculture statistics bear out PPC's claim. While plastic bottles accounted for nearly 98.4% of 1-gal milk container sales in 1985, paperboard containers held their own in the smaller sizes. Between 1983 and 1985, sales of half-gal paperboard milk cartons slipped 5.4%—nowhere near the 50% loss some were predicting. Sales of SBS quart containers remained unchanged during the period. Paperboard containers control close to 100% of milk sales in the pint, half-pint, one-third-quart, and 10-oz container sizes because making smaller paper cartons is more economical than making small plastic bottles.

A few years ago, there were rumors that supermarkets would try to make pricing of small volumes of milk more equitable with large sizes, which would help the cause of SBS cartons. So far, however, there appears to be little indication that this has happened. It seems that SBS producers have time on their side. As the Baby Boom generation ages and the population in the U.S. gets older, people will probably prefer to buy smaller volumes of milk.

Improving printability. All five major milk carton producers in the U.S. (Champion International Corp., IP, Potlatch Corp., Westvaco, and Weyerhaeuser Co.) have gone to considerable effort and expense to improve the strength, smoothness, and printability of their liquid packaging board. A spokesman for Potlatch said the driving force behind these upgrades is the desire to halt the erosion of market share lost to plastics. Milk cartons provide a low-cost alternative to plastic and offer printing and graphic advantages that plastic does not have. "Paperboard producers are regaining market share because converters can use four-color, flexographic, and lithographic printing on the packages so that they just jump off the shelf," he said.

Fluid milk sales by package size and type.*

This summer Weyerhaeuser Co. started up its newly rebuilt liquid packaging board machine at its Longview, Wash., mill. The mill now has capacity for over 200,000 tpy of milk carton stock. The rebuilt machine makes a stronger, smoother multi-ply board called StructurePak for use in milk and juice cartons. The company believes the board is of sufficient quality to be used in the packaging of fastfood.

Meanwhile, it has been reported that Champion has stopped making its TasteSaver liquid packaging board, which it introduced in January 1985. The board was designed to keep juices fresher without a foil layer by using a polypropylene coating in addition to a polyethylene coating. The company continues to produce its DairyPak milk and juice cartons, which use over 80% of the 705 tpd of bleached paperboard made at its Canton, N.C., mill. ■

ENVIRONMENT/ENERGY

Dioxin discharge limits may be imposed

A joint study conducted by the Environmental Protection Agency and the American Paper Institute due to be released next month reveals that some paper mills discharge dioxin. Dioxin has been shown to be toxic to laboratory animals, but the long-term effects of dioxin on people have not been fully documented. It is possible that the EPA may impose discharge limits on dioxin this year.

The joint study, 75% funded by API and 25% by EPA, monitored the discharge of five paper mills: James River Corp., Wauna, Ore.; Boise Cascade Corp., International Falls, Minn.; International Paper Co., Jay, Maine; Mead Corp., Chillicothe, Ohio; and Champion International Corp., Lufkin, Texas. The EPA's preliminary report indicates that discharges from at least three of the five paper mills contain up to 100 parts per quadrillion of dioxin.

All of the mills produce either bleached or semibleached kraft pulp. The chlorine in the bleached kraft pulping process is believed to generate dioxin.

About 85 mills in the U.S. use the kraft bleaching process, according to Red Cavaney, president of the API. This represents about 20% of the

Kraft pulping: shifts away from saltcake continue

COOKING. Makeup chemicals for kraft pulping liquor are changing. The use of saltcake is decreasing as mills seek to ease operations by employing caustic, sodium hydrosulfide and elemental sulfur for their makeup needs. These chemicals have been the benefactors of production during the last few years, with consumption rates rising for each. Even with strong prices and ample supply, use of these chemicals will follow production while saltcake use will remain flat or (probably) decline.

Kraft pulp production in the U.S. and Canada will set new records again in 1987. This segment of the industry is running about 4% over 1986. Mills have very high operating rates. No large capacity increases (new mills, etc.) are scheduled and the incremental increases undertaken recently have been absorbed without any significant threat to the market. North American capacity of chemical pulp should grow about 1% per year through 1990.

Saltcake use is down. Mills are seeking ways to curtail processing of liquor, such as dissolving and other handling procedures. Sensitivity in storage, corrosion concerns, and cost of processing (capital and production) are the reasons for moving toward site-ready material. Delivered liquids are the trend of today. The emulsified sulfur business has grown substantially over the past two years, as have sodium hydrosulfide and sulfate/sulfite mixtures from industries producing it as a byproduct (such as sodium hydrosulfite generation). Caustic consumption in kraft pulping is climbing alongside these compounds. Systems using these chemicals can place delivery equipment close to the digester and meter material on demand. Other companies are said to be interested in supplying emulsified sulfur, but the industry leader will continue to be Chemical Enterprises, Houston, Texas.

Price changes have occurred. Caustic products across the board have risen a tremendous 30% in 1987. Sulfur prices are slumping, but this will not have an effect on slurries because of the tightness of availability and the production cost factor in manufacturing product. Sodium hydrosulfide and saltcake prices are unpredictable due to the site-specific nature of sources and their customers.

Should the price of caustic continue its upward spiral, new light may be cast on the use of soda ash as the sodium source. Another applied technology to watch is the expansion of chlorine dioxide generators from which spent acid and saltcake are produced. More interest in systems that curtail saltcake production is evident, making consumption of prepared liquids grow faster.

Use of defoamers in brownstock washing is strong. There are relatively few new equipment installations (such as the Ultrawasher and Chemiwasher), and most systems are already operating above design capacity. Anthraquinone, modified cooking, and other kraft pulping enhancing techniques have caught on in Japan and Europe but have yet to achieve any real success in North America.

RECOVERY. Lime consumption traditionally follows production very closely. Most mills can recover 90% or more of the total consumed. Makeup is needed for process losses including escape, upsets and spillage. Oxygen is also used as a crutch for mills seeking temporary additional kiln capacity.

Purchased lime from the industry in 1986 was up 8% and this year will prove similar. This figure includes all areas of consumption such as recovery, water treatment, and a recent strong segment—precipitated calcium carbonate generation. There are many lime producers in the U.S., with Dravo Lime Co. operating three of the top ten facilities.

No new consumption patterns are apparent in recovery. Suppliers do not anticipate any significant changes in price or availability in the foreseeable future.

— Michael Ducey

Chemical	P&P Consumption 1986	% change 1987	Price 1987	% change 1987
Sodium sulfate	500,000	0.2%	$50/ton	−25%
Sodium hydrosulfide	22,800	6%	$500/ton	0%
Caustic	2,000,000	8%	$195/ton	30%
Lime	1,200,000	8%	$50/ton	−15%
Defoamers	26,000	12%	$1/lb	4%

RECORD U.S. PAPER PRODUCTION SPURS STRONG DEMAND FOR WASTEPAPER

Paperstock market should remain stable for the rest of 1987, but mandatory recycling programs could flood market in the long term

By REGINA M. McGRATH, News Editor

The U.S. wastepaper market heated up quickly during the first quarter, with prices increasing on most grades. Although the market was less frenzied in the second quarter, prices and demand remained strong. The prognosis for the second half is clouded by unpredictable currency fluctuations, but most market observers do not expect to see any major decline in prices for any of the paperstock grades for at least the rest of 1987.

The record production year the U.S. pulp and paper industry is currently enjoying is the main reason for rising wastepaper prices. Containerboard mills are running full-out and tissue mills are running in the high 90's. Offshore demand, particularly for old corrugated containers, was strong during most of the first half but began to ease in July.

Rising wastepaper prices was the main reason cited by recycled boxboard producers when they instituted their first-half price hike. Producers of recycled tissue have been unable to raise prices on roll products, but this might occur early next year.

TABLE 1: **1986 wastepaper data (short tons).**

	Consumption at U.S. paper and paperboard mills*	Exports	Total collected
News	3,143,011	766,087	3,909,098
Corrugated	8,682,115	1,529,772	10,211,837
Mixed	2,028,129	693,697	2,721,826
High grades	4,034,488	759,205	4,793,693
Total	**17,887,743**	**3,748,711**	**21,636,454**

1985 wastepaper data

	Consumption at U.S. paper and paperboard mills*	Exports	Total collected
News	3,174,989	625,631	3,800,620
Corrugated	7,899,441	1,310,876	9,210,317
Mixed	1,901,502	879,825	2,781,327
High grades	3,874,123	469,594	4,343,717
Total	**16,850,055**	**3,285,926**	**20,135,981**

* Includes consumption at plants making molded pulp and insulation products.
Source: American Paper Institute.

PRICE TRENDS SO FAR THIS YEAR. The unbleached grades showed the biggest price increases during the first half. The price of old corrugated containers in the New York City area rose about $20 between January and July to between $70 and $80/short ton. The price for new double-lined kraft corrugated clippings also rose by about the same amount.

In the bulk grades, the price for old newsprint increased between $5 and $10 during the half to between $45 and $50/ton nationwide. Mixed paper prices didn't show as much movement as the other bulk grades, although prices in some regions of the country rose $5/ton.

Pulp substitute prices were a matter of debate during much of the first half and remain a question mark in the second half. During May, many wastepaper dealers were predicting a $10 to $20 drop in price, but this never materialized when July rolled around. Some dealers even suggested that prices could rise in the fourth quarter, particularly if pulp prices in the U.S. rise again.

Demand for deinking stock has been the most consistent of all the paperstock grades. The price of manifold colored ledger rose at least $10/ton nationwide during the first half. In July, deinking prices jumped because Kimberly-Clark Corp. began buying heavily.

RECOVERY. The recyclable recovery rate has been on an upward trend overall for the past two decades, with some minor setbacks along the way. It has hovered at about 26% since 1980, but broke that barrier in 1986 when the rate reached 28%. This was due to a 13.3% rise in exports and a 7.4% increase in the amount of recyclable paper recovered.

The American Paper Institute reports that total collections of old newspapers in 1986 reached 3.9 million short tons, a 4% increase over 1985. Collections of old corrugated containers totaled 10.2 million short tons last year—a 10.8% increase over 1985. Collections of mixed

papers totaled 2.7 million short tons in 1986, a drop of 4.7% from 1985. This is mainly due to export customers buying more OCC and news because mixed paper shipments are becoming more contaminated with plastics, metals, and other nonfibrous materials.

Total collection of high grades of deinking stocks and pulp substitutes in 1986 was 4.8 million short tons, up 8.5% from the previous year. This reflected the increasing yield of clippings from factories making paper products such as envelopes, business forms, and printed brochures. Demand for the high grades was good also, due to mills shifting more fiber furnish over to secondary fiber from woodpulp.

FUTURE DEMAND. The wastepaper market in the U.S. is divided into four regions: the New York area, the Midwest, the Southeast, and the West Coast. Right now, the best place to be a wastepaper dealer is the Southeast. Two new waste-based machines are expected to come onstream there in the next two years.

Southeast Paper Manufacturing Co. is building a 210,000-tpy recycled newsprint machine at its mill in Dublin, Ga. Plus, Fort Howard Corp. will start up the second recycled tissue machine at its Rincon, Ga., mill next year. The first machine started up in April and has capacity for about 250 to 400 tpd of tissue, depending on the product being made. The third machine is slated to come online in 1990 and the fourth in 1992.

Georgia cannot generate enough wastepaper to supply Southeast Paper and the second Fort Howard unit, let alone the two Fort Howard machines that will start up in the next decade. This could spur increased paper collection in Florida and neighboring states and is definitely causing the price of wastepaper in that region to rise.

WEAK DOLLAR HELPS EXPORTS. The U.S. is the world's largest exporter of wastepaper. In 1986, U.S. exports of paperstock reached an all-time high of 3.75 million short tons. Through the first five months of 1987, exports were 13.9% ahead of the year-earlier period at 1.7 million tons. Exports are expected to exceed 4 million tons this year. The three largest consumers of U.S. paperstock in 1986 were Taiwan (891,691 tons), Rep. Korea (839,714 tons), and Mexico (564,333 tons). Together these countries accounted for 61.1% of all U.S. wastepaper exported in 1986.

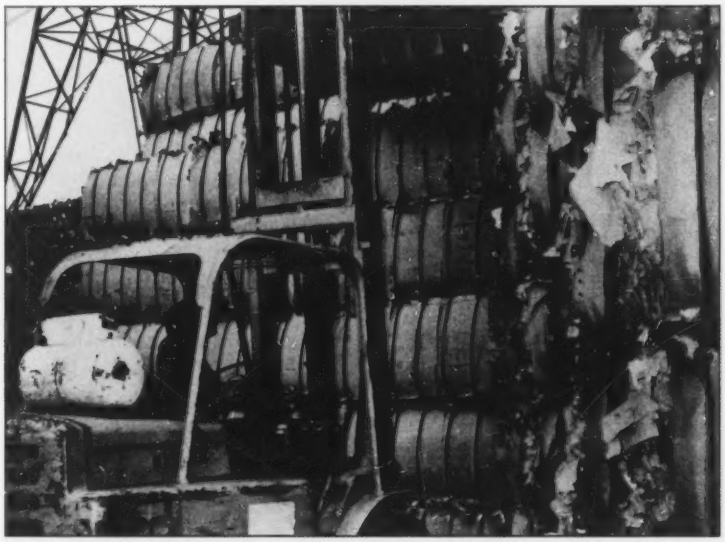
The export market for wastepaper was quite strong during most of the first half but began to show weakness in July. For example, the export price of OCC from the West Coast rose about $30 between May and June to between $130 and $135/ton. But by July the price had fallen by about $10, mainly due to the fact that Korea and Taiwan had sufficient inventories and were staying out of the market.

The weak U.S. dollar has caused some aberrations in the offshore markets. In some cases it is cheaper for overseas mills to buy paperstock directly from the U.S., bypassing foreign wastepaper dealers altogether. At the end of the first half, some Far Eastern countries turned to Europe for wastepaper since some countries there were oversupplied. The West Coast is most sensitive to offshore demand, and the market there was showing more weakness than the other regions in the beginning of the second half.

FUTURE TRENDS. U.S. mills find they are facing increasing competition from overseas for certain grades of paperstock. For example, in 1980 U.S. exports of pulp substitutes amounted to 205,000 tons compared with 312,000 tons in 1986—more than a 50% increase. About 176,000 tons of deinking grades were exported in 1980 compared with 447,000 tons in 1986.

This kind of competition is exacerbated by the construction of waste-to-energy facilities in the U.S. In order to protect themselves, more primary producers are getting involved in recycling, integrating their operations fully or partially. This will also force mills to use mixed grades of paperstock since they may no longer have the luxury of buying enough of one grade.

Mills are searching for ways to make better use of computer printout (CPO) that has been contaminated with laser printing. So far, no known technology has been accepted by the industry as a viable means of eliminating the ink from laser-printed CPO. Tissue makers cannot use CPO with laser marks. The increasing use



The U.S. is the world's largest exporter of wastepaper. This year it is expected to ship over 4 million tons overseas.

of laser printers on fine paper grades makes this problem especially urgent.

LACK OF LANDFILL SPACE. The U.S. is running out of landfill space in which to put its trash. According to *Recycling Today*, the tipping fees paid by refuse haulers in the U.S. rose 13% in 1986. Prices paid to dump refuse at landfills in the Northeast average about $20/ton and amount to about $10/ton in the rest of the country. Many trash haulers would be glad to pay these prices, but the landfill in their area is full, so they are also forced to pay to have the trash transported to another landfill. In some East Coast cities, disposing of a ton of trash now costs $100.

This lack of space has caused many states to institute mandatory recycling programs. Rhode Island and New Jersey both have laws requiring separation of specific household recyclables. Massachusetts and Pennsylvania are considering similar bills, and Michigan, New York, and Delaware are studying ways of dealing with their landfill problems.

The effect of such laws on the national paperstock market is a matter of debate. Paperstock dealers are wary of mandatory recycling because the quality of recycled paper is expected to decline while the quantity will increase. The worst-case scenario can be seen in Fed. Rep. Germany, where a flood of low-grade wastepaper has caused the paperstock market to hit bottom.

On the other hand, wastepaper dealers may be able to ally themselves with the municipal governments by processing the paper waste or buying the paper collected by the city. The impact these programs will have on paperstock prices depends on whether the municipality sells its stock below market prices, gives it away, or pays for its removal.

LANDFILL ALTERNATIVES. Waste-to-energy plants account for about 8% of the total waste stream in the U.S. and 1% in Canada, according to *Recycling Today*. Of this 8%, about 20% of the waste they burn must be landfilled as ash. Of the planned waste-to-energy plants, 41.3% are in the Northeast, 22.7% are in the South, 18.7% are in the north-central region, and 17.3% are in the West, Babcock & Wilcox reports. One problem with these plants is that if paper is removed from the waste stream, it is more difficult to burn the remaining waste. Also, the Environmental Protection Agency is considering regulating the flyash from these plants as a hazardous waste. The flyash would have have to be separated and disposed of in a landfill, taking up valuable space.

Of course, Americans could always try to throw away less trash. The reverse is happening, however, because the proliferation of two-income families with more money than time causes trash generation to increase. For example, more people eat out, so the number of boxes, bags, and other fast-food containers entering the waste stream has increased. ■

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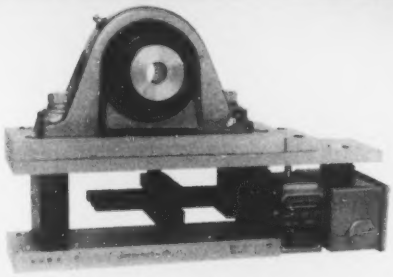

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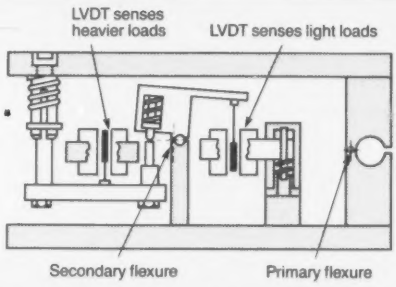

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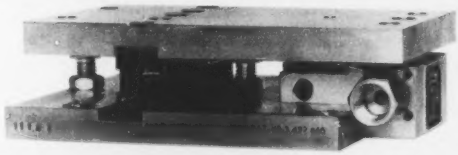

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